

REMARKS

The Examiner did not indicate in the Office Action that the replacement drawings mailed on March 19, 2004 were received. Accordingly, copies of the replacement drawings are included herewith.

Claims 1-62 are pending in the application. In the Office Action at hand Claims 1-15 and 32-46 are withdrawn from consideration, and Claims 16-31 and 47-62 are rejected.

Claims 16-23 and 47-54 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Son (US 5,917,459) in view of Sakata (US 6,945,652) and Yan (US 5,865,529). In addition Claims 24-31 and 55-62 are rejected under Section 103(a) as being unpatentable over Son, Sakata and Yan, in view of Hirata (US 6,894,729). In response to the Section 103 rejections, the Applicant respectfully submits that Claims 16-31 and 47-62, as amended, are not obvious in view of Son, Sakata, Yan and Hirata. Reconsideration is respectfully requested.

Claim 16, as amended, recites a display system including a display device for providing images. A first light source emits light. A first light collection lens system has a substantially spherical hollow lens for collecting the light emitted from the first light source and directing the light in a first beam of light to the display device for illuminating the images on the display device for viewing. The hollow lens has a substantially spherical interior portion. The first light source is extended within the substantially spherical interior portion. Claim 47, as amended, is a method claim that generally parallels Claim 16, as amended.

Claims 16 and 47 have been amended to recite “a substantially spherical hollow lens” and “the hollow lens having a substantially spherical interior portion, the first light source extending within the substantially spherical interior portion”. Support for these amendments is found at least in Figs. 4-8, as well as on page 7, line 14 through page 8, line 5 of the Specification as originally filed. No new matter is introduced.

Referring to Figs. 4-6, in one example of an embodiment in the present invention, the hollow lens 28 is substantially spherical, and can be about a $\frac{3}{4}$ sphere. The light source 24a can be extended within the substantially spherical interior portion of the hollow lens 28. By positioning the light source 24a within the substantially spherical interior portion, the hollow lens 28 can collect or shape light that is emitted from the light source in a hemisphere pattern, and direct the light in a beam towards LCD 34 in an efficient manner with minimal loss of light. As

a result, the brightness of the projected images can be maximized, or alternatively, the power of the light source can be minimized.

In contrast, Son discloses in Fig. 3, a holographic display 300 in which light from a light source 11 is directed to an information display 13 through a collimator 12. Images on the information display 13 are projected onto a reflection type holographic combiner 14 via a relay optical system 2 and a reflection mirror 3. Son does not have a hollow lens.

Sakata discloses in Fig. 9 a projection system having red 91a, green 91b and blue 91c LEDs. Sakata does not have a hollow lens.

Yan discloses in Figs. 1 and 2, an LED lamp that has a light emitting source contained within a transparent envelope 10. The light emitting source is positioned within a reflector 140. The transparent envelope 10 has an elongated cylindrical portion with straight side walls, and a hemispherical tip 12. The light emitting source is positioned within the cylindrical portion of the envelope 10 below the hemispherical tip 12 by a distance that is about equal to the radius of the cylindrical portion. Light from the light emitting source can be directed out the hemispherical tip 12 in a cone shaped pattern. However, light can also escape the transparent envelope 10 laterally through the straight sidewalls of the cylindrical portion below the hemispherical tip 12 due to the location of the light emitting source within the cylindrical portion. Such positioning of the light emitting source within the cylindrical portion results in a less efficient manner of directing light out of the tip than in the claimed invention, and can require more power to produce an equivalent beam of light.

Accordingly, Claims 16-23 and 47-54, as amended, are not obvious in view of Son, Sakata and Yan, since none of the references, either alone or in combination, teach or suggest “a substantially spherical hollow lens” and “the hollow lens having a substantially spherical interior portion, the first light source extending within the substantially spherical interior portion”, as recited in base Claims 16 and 47, as amended. Therefore, Claims 16-23 and 47-54, as amended, are in condition for allowance. Reconsideration is respectfully requested.

Hirata discloses in Figs. 3 and 4, a display in which light from a light source La1, is directed through filter F1, polarized beam splitter PBS, microlens arrays MLA and MLB, element FL1, mirrors M1 and M2, dichroic mirrors DM1, DM2 and DM3, element FL12, polarizers 8a and 8b, LCD 7, and projection lens 12. Hirata does not have a hollow lens.

Accordingly, Claims 24-31 and 55-62 are not obvious in view of Son, Sakata, Yan and Hirata since none of the references, either alone or in combination, teach or suggest "a substantially spherical hollow lens" and "the hollow lens having a substantially spherical interior portion, the first light source extending within the substantially spherical interior portion", as recited in base Claims 16 and 47, as amended. Therefore, Claims 24-31 and 55-62 are in condition for allowance. Reconsideration is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By 

Darrell L. Wong

Registration No. 36,725

Telephone: (978) 341-0036

Facsimile: (978) 341-0136

Concord, MA 01742-9133

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